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(54) METHOD FOR MANUFACTURING SHEET-LIKE MACROMOLECULAR WATER ABSORBER AND SHEET-LIKE MACROMOLECULAR WATER ABSORBER

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a method for manufacturing a sheet-like macromolecular water absorber which is made to have flexibility by reducing its total thickness and by making the permeability and bonding power of a water absorption layer into and to nonwoven sheet-like base cloth sufficient when manufacturing the water absorber, and the subject water absorber.

SOLUTION: In the method by which the sheet-like macromolecular water absorber is manufacturing through a liquid draining step and a drying step after particular macromolecular water absorptive resin slurry in which a water- containing organic solvent is dispersed is applied to the nonwoven sheet-like base cloth 1, a compacting section 9 which compacts the base cloth 1 in a wet state by sticking a water absorbing component, such as the SAP, MFC, to the cloth 1 in the manufacturing process of the water absorber is used.



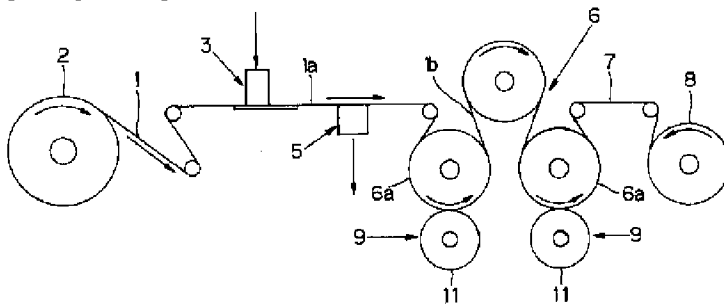
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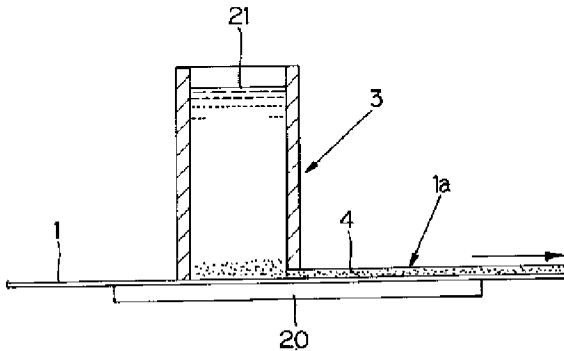
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DRAWINGS

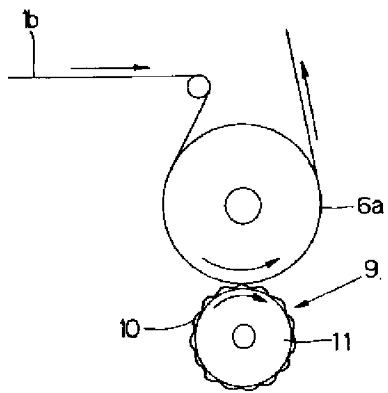
[-- figure 1]



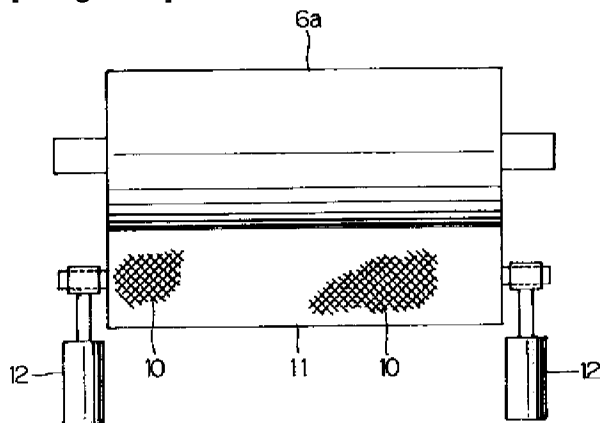
[-- figure 2]



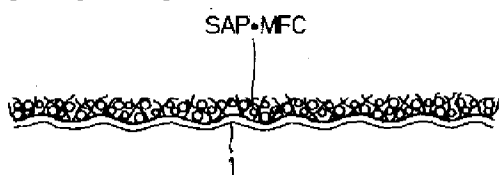
[-- figure 3]



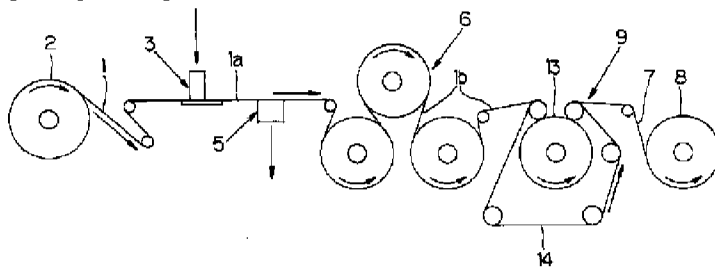
[-- figure 4]



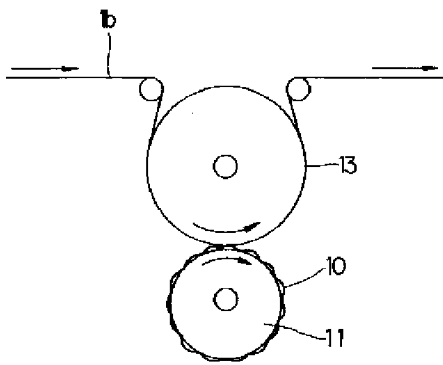
[-- figure 5]



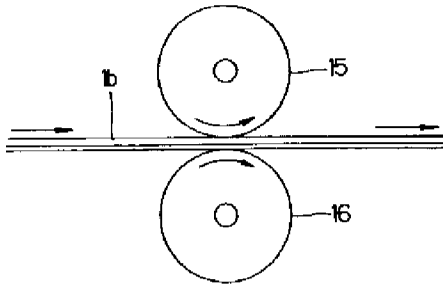
[-- figure 6]



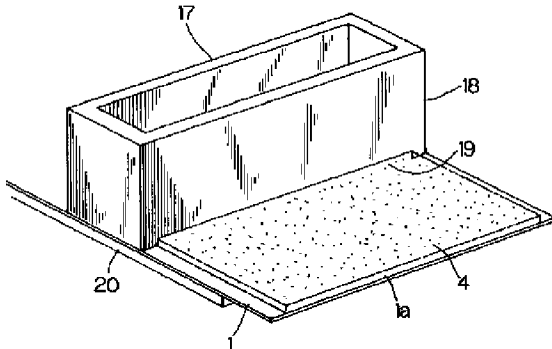
[-- figure 7]



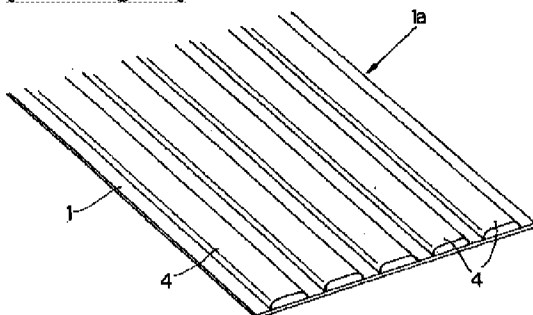
[-- figure 8]



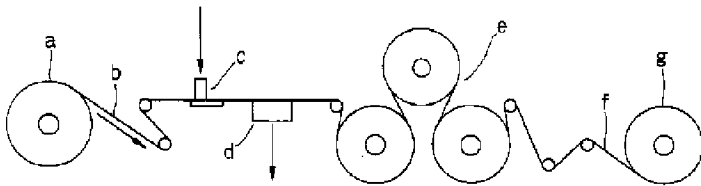
[-- figure 9]



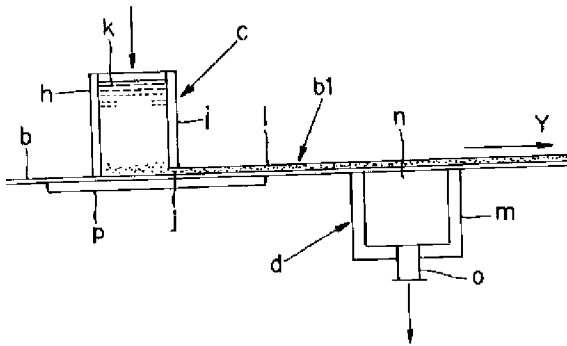
[Drawing 10]



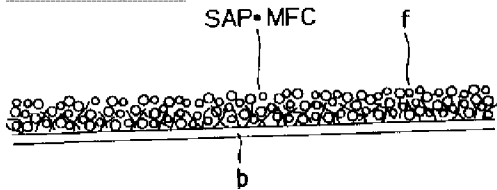
[Drawing 11]



[Drawing 12]



[Drawing 13]



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CLAIMS

[Claim(s)]

[Claim 1] In an exposure device which irradiates an exposure object (1) with recording light corresponding to a slot which should be formed, When an optic axis compounds two or more lights ($L_{11} - L_{14}$; $L_{21} - L_{26}$) with which a mutually different position was displaced. An exposure device having a recording light creating means (1, 2, 5, 9, 11, 21, 3; 1, 2, 5, 9, 11 and 51, 3; 1, 2, 5, 61, 3) which generates said recording light.

[Claim 2] The exposure device comprising according to claim 1:

A light source (1) which emits light of wavelength predetermined in said recording light creating means (1, 2, 5, 9, 11, 21, 3).

A division means (2) to divide into two or more lights light emitted from said light source (1).

An optic-axis change means to change an optic axis of two or more lights divided by said division means (2) in a mutually different position (21, 51, 61).

A synthesizing means (25) which an optic axis compounds said two or more lights ($L_{11} - L_{14}$, $L_{21} - L_{26}$) changed by mutually different position, and outputs as recording light by said optic-axis change means (21, 51, 61).

[Claim 3] The exposure device according to claim 2 making an optic axis of light change by said optic-axis change means' (21)'s consisting of a lens (28) of a couple, and making a medial axis of a lens (28) of this couple change mutually.

[Claim 4] The exposure device according to claim 2, wherein said two or more lights have a means (22, 23, 24) which makes low luminous intensity located in an end compared with light located among centers.

[Claim 5] Intensity of light (L_{21} , L_{22}) located in the center among said two or more lights ($L_{11} - L_{26}$) is reduced compared with intensity of light ($L_{23} - L_{26}$) located in an end according to information, The exposure device according to claim 2 having a modulation means (64) which forms unevenness according to this information in the center of said slot (61).

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the sheet-shaped polymers water absorption body manufactured by the method of manufacturing the sheet-shaped polymers water absorption body used as the substrate of absorptivity products, such as a diaper and a sanitary napkin, and this method.

[0002]

[Description of the Prior Art]The diaper for a child or adults, a sanitary napkin, and absorptivity products like a breast milk pad, On one side of the sheet-shaped base fabric made of a nonwoven fabric, SAP (water-absorbing resin), MFC (fine cellulose textiles), The particle state polymers hydrophilic resin of the slurry form which mixed the hydrous organic solvent etc. After attracting and deliquoring a part for the liquid of the sheet-shaped base fabric which applies (a polymers hydrophilic resin slurry is only called hereafter), absorbs the moisture contained in the polymers hydrophilic resin slurry, and has become wet-like as a whole, A drying process is carried out and the thin products which use the sheet shaped dry high absorptivity substrate to which SAP, MFC (a water absorption ingredient is only called hereafter), etc. adhered are increasing.

[0003]For this reason, he rolls round the sheet shaped dry substrate f for products via the dryer part e which consists coating part c and the deliquoring part d of a through and multiple heating roller group in the sheet-shaped base fabric b made of a nonwoven fabric pulled out from supply-roll a, and is trying to roll round on the roll g in the former, as shown in drawing 11.

[0004]the merit to whom coating part c carried out the opening of the upper and lower sides as shown in drawing 12 -- the type coating box h is installed on the base fabric b in the state of intersecting perpendicularly with the length direction (running direction) of the sheet-shaped

base fabric b made of a nonwoven fabric. And the clearance j is formed between the side-attachment-wall lower end of one side of the coating box h, i.e., the lower end of the side attachment wall i located in the running direction downstream of the base fabric b, and the base fabric b, The polymers hydrophilic resin slurry k accommodated in the coating box h flows out of this clearance j on the base fabric b, and is applied on the base fabric b as the water absorption layer l by the lateral width of the clearance j, and a height interval. The polymers hydrophilic resin slurry k is supplied to the coating box h from the mixing chamber which is not illustrated.

[0005]The deliquoring part d provided in the undersurface of the base fabric b in the lower stream of the coating box h. the coating box h -- the same -- merit -- the length direction (running direction) of the base fabric b allocates type deliquoring suction box m in the direction which intersects perpendicularly, and while carrying out the opening of the upper surface which touches the base fabric b and considering it as the suction opening n, it connects with the suction unit of the exterior which does not illustrate the hole o for suction formed in the undersurface.

[0006]The whole base fabric b is a wet-like sheet by applying the polymers hydrophilic resin slurry k to the base fabric b with the coating box h, If a suction unit is operated as this wet sheet b1 runs to Y arrow direction of drawing 12, air will be attracted in deliquoring suction box m from the upper part of the wet sheet b1, With the vacuum negative pressure generated in deliquoring suction box m, a part for the liquid contained in the wet sheet b1 is attracted, and deliquoring processing is made.

[0007]Thus, a drying process is made in the dryer part e, and the wet sheet b1 to which the water absorption ingredient after deliquoring was made adhered turns into a dry sheet in which the base fabric b and the water absorption ingredient were combined, is rolled round as the substrate f for products, and is rolled round by the roll. The numerals p in a figure are support plates which the coating box h sets caudad and are supporting the base fabric b.

[0008]Since the water absorption layer l is applied and unified all over almost [of the upper surface of the base fabric b] according to the above device, when it produces commercially as a diaper or a sanitary napkin, it swells more than needed, and the water absorption layer l which absorbed moisture is wearing, and has sense of incongruity. If the water absorption layer l is applied all over the base fabric b, the portion which does not suit the curve of the body will arise on product processing, and it also becomes a cause of liquid leakage, and also becomes spoiling a feeling of wear.

[0009]So, in recent years, in accordance with the length direction of a nonwoven fabric nature sheet-shaped base fabric, the water absorption layer of two or more stripe shape is applied, by deliquoring and drying, manufacture of the product which suited the curve of the body is possible, there is no leak, and the sheet-shaped polymers water absorption body with easy

processing is provided.

[0010]

[Problem(s) to be Solved by the Invention]The substrate f for products formed by an above device is in the state where SAP, MFC, etc. which are water absorption ingredients condensed and adhered in the mixed state on the base fabric b, as [show / in drawing 13]. And although a part of SAP and MFC are in the state where it was involved with the cilia of the base fabric b, Since a great portion of SAP and MFC are in the state where it has only adhered and their combination with the base fabric b is weak, When the curvature movement was added at the time of the wet which produced commercially as a diaper or a sanitary napkin and inhaled the time of dry cleaning currently worn, or water, it had the problem that a water absorption ingredient separated easily from the base fabric b.

[0011]This invention provides the compaction part which carries out the compaction of a base fabric and the water absorption ingredient into the manufacturing process of the substrate for products, The perviousness of a water absorption ingredient and combination to a base fabric are made into sufficient thing, and the manufacturing method of a sheet-shaped polymers water absorption body and sheet-shaped polymers water absorption body which reduce the thickness of the whole water absorption ingredient spreading sheet, and gave pliability are provided.

[0012]

[Means for Solving the Problem]In order to attain the purpose described above this invention method, In a method of applying to a sheet-shaped base fabric made of a nonwoven fabric a particle state polymers hydrophilic resin slurry which a hydrous organic solvent was made distributing, and manufacturing a sheet-shaped polymers water absorption body through deliquoring and a drying process, Into a manufacturing process of a sheet-shaped polymers water absorption body, the compaction part 9 which carries out the compaction of the base fabric 1 in the state where it adhered and became wet about water absorption ingredients, such as SAP and MFC, is formed.

[0013]The aforementioned compaction part 9 is the dry roll 6a, the dry roll 6a, and parallel state of the dryer part 6, and consists of the pressure roll 11 which can be welded by pressure to the dry roll 6a, and the pressure roll 11 forms the uneven part 10 in which a partial compaction is possible all over a peripheral face.

[0014]The compaction part 9 consists of the compaction roll 13 and the pressurizing belt 14 of endless form which goes around according to rotation of the compaction roll 13, and presupposes that pressure welding on the compaction roll 13 is possible for the pressurizing belt 14 which has a rugged surface in which a partial compaction is possible on the whole surface.

[0015]The compaction parts 9 are the compaction roll 13, the compaction roll 13, and parallel

state, and consist of the pressure roll 11 which can be welded by pressure to the compaction roll 13, and the pressure roll 11 forms the uneven part 10 in which a partial compaction is possible all over a peripheral face.

[0016]The compaction part 9 consists of parallel state compaction roll 15 and pressure roll 16 of an up-and-down couple, and enables again pressure welding of the pressure roll 16 in which the uneven part 10 in which a partial compaction is possible was formed all over the peripheral face, to the compaction roll 15.

[0017]A sheet-shaped polymers water absorption body which becomes this invention, A polymers hydrophilic resin slurry which made a hydrous organicity medium distribute SAP (water-absorbing resin) and MFC (fine cellulose textiles) is applied to the nonwoven fabric nature sheet-shaped base fabric 1. Apply a partial compaction for the water absorption ingredient adherent sheet 1b which deliquored and formed the obtained wet sheet 1a during desiccation or after desiccation, cilia, and SAP and MFC of the base fabric 1 are made to become entangled, and it joins together.

[0018]

[Embodiment of the Invention]Hereafter, according to a drawing, an embodiment of the invention is described in detail. Drawing 1 shows one embodiment of this invention method, the sheet-shaped base fabric 1 made of a nonwoven fabric is pulled out from the supply roll 2, and it is considered as the wet sheet 1a which has the water absorption layer 4 by applying a polymers hydrophilic resin slurry to the upper surface of the base fabric 1 in the coating part 3 (refer to drawing 2).

[0019]Then, parts for a hydrous organic solvent or other liquid, etc. which are contained in the wet sheet 1a which consists of the base fabric 1 and the water absorption layer 4 in the deliquoring part 5 are attracted and deliquored, It is the same as the conventional device to heat and dry by the dryer part 6 which consists of two or more heating roller groups, to roll round the wet sheet 1a as the sheet shaped dry substrate 7 for products which water absorption ingredients, such as SAP and MFC, combined with the base fabric 1 eventually, and to roll it round on the roll 8.

[0020]In the production line of the substrate 7 for products, after deliquoring, dry and a part for a certain amount of liquid is removed in this embodiment, By giving a partial pressure to the base fabric 1 (the water absorption ingredient adherent sheet 1b is only called hereafter) with which the state where water absorption ingredients, such as SAP and MFC, adhered became wet, it has the feature to have formed the compaction part 9 which can combine the base fabric 1 and a water absorption ingredient in one.

[0021]As the compaction part 9, as details are shown in drawing 1 and drawing 3, and drawing 4, all over a peripheral face, it is usable in the pivotable pressure roll 11 in which the uneven part 10 of mesh shape was formed, and this pressure roll 11 is welded by pressure to the

pivotable heating roller 6a in the dryer part 6 at parallel state, for example. And partial compactions, such as a field compaction and a line compaction, will be applied to the base fabric 1 by what is necessary's being just to let between the heating roller 6a and the pressure rolls 11 pass, and contacting the uneven part 10 in the water absorption ingredient adherent sheet 1b. While being able to weld the pressure roll 11 by pressure to the heating roller 6a by using the cylinder 12 of a right-and-left couple as shown in drawing 4 for example, adjustment of welding pressure is possible for it.

[0022]Although it is not in the state where a part for all the liquid was attracted, and is moist, even if the wet sheet 1a carries out deliquoring processing in the deliquoring part 5, and a final drying process is carried out by the dryer part 6, The damp water absorption ingredient adherent sheet 1b after deliquoring by carrying out a compaction between the heating roller 6a and the pressure roll 11, Since the opposite side which applied, the undersurface, i.e., the water absorption ingredient, of the base fabric 1, touches the pressure roll 11 and, as for the water absorption ingredient side, the surface touches the smooth heating roller 6a, As shown in drawing 5, the whole thickness reduces the base fabric 1 while the whole becomes rugged surface-like by the partial compaction by the pressure roll 9, and pliability and flexibility are given.

[0023]Especially the water absorption ingredient in the state where it became wet by the partial compaction of the uneven part 10 comes to be pushed in into the cilia of the base fabric 1, it will specifically be in the cilia of the base fabric 1, and the state of a tangle of SAP, MFC, etc., and a water absorption ingredient and cilia will be firmly combined by drying after that. In order to push in a water absorption ingredient into the base fabric 1, it is required for a water absorption ingredient to have a certain amount of mobility, and although the high dry anterior part of hygroscopic surface moisture is more effective, it is good for giving flexibility in the dry central part whose moisture decreased comparatively, or an after-desiccation appearance meeting.

[0024]Two or more rolls are formed in the running direction and sliding direction of the base fabric 1, as shown in drawing 1, the wet sheet 1a circulates through between the heating rollers 6a of up-and-down plurality, and the heating roller 6a in the heating unit 6 runs, but. The pressure roll 11 may be welded by pressure to all the heating rollers 6a with which the undersurface of the base fabric 1 serves as facing down, or it may be made to weld the pressure roll 11 by pressure only to some heating rollers 6a, and it can choose these if needed.

[0025]It is [shape / in which a partial compaction is possible / of the uneven part 10 / which was formed in the surface of the pressure roll 11 / meshes-of-a-net] usable in various shape, such as circular, a rectangle, and a tortoise shell form. Or the projected rim of wave shape is formed along the hoop direction of the pressure roll 11, for example, without limiting to

meshes-of-a-net shape, It may be made to provide the waveform convex which provided a majority of these projected rims in this parallel state in the length direction of the pressure roll 11, or was formed in accordance with the length direction of the pressure roll 11 in a hoop direction at two or more parallel state, and to the base fabric 1, if a partial compaction is possible, shape of the uneven part 10 will not be asked.

[0026]Although it is usable in the thing of the following three kinds of mixed ingredients as a polymers hydrophilic resin slurry in this invention, It is also possible to use the polymers hydrophilic resin slurry which consists of a publicly known polymers hydrophilic resin slurry or other ingredients conventionally according to the purpose of using absorptivity products, such as not the thing limited to this but a diaper, a sanitary napkin, a breast milk pad. However, it is a necessary condition to contain SAP, MFC, etc., such even case.

(1) SAP (water-absorbing resin) 20.0%MFC (fine cellulose textiles) 0.6% dispersing solvent (hydrous organic solvent) 79.4% (ethanol 70:H₂O 30)

(2) SAP (water-absorbing resin) 25.0%MFC (fine cellulose textiles) 0.5% dispersing solvent (hydrous organic solvent) 74.5% (propylene glycol 70:H₂O 30)

(3) SAP (water-absorbing resin) 19.5%MFC (fine cellulose textiles) 0.5% dispersing solvent (hydrous organic solvent) 80.0% (isopropyl alcohol 70:H₂O 30)

Spherical as SAP and it is usable in a flake-like thing. In addition to this, it is usable, and by this invention, SAP of granularity or a pellet type also named these generically, and has called them the particle state polymers hydrophilic resin slurry.

[0027]Drawing 6 shows a second embodiment of this invention method, and the same portion as the aforementioned embodiment is using the same numerals. In this embodiment, the compaction part 9 is rolled round with the dryer part 6, and it provides between the rolls 8. This compaction part 9 consists of the pressurizing belt 14 of the endless form which goes around according to rotation of the pivotable compaction roll 13 and the compaction roll 13 leftward centering on a supporting spindle, and welds the pressurizing belt 14 by pressure to the compaction roll 13 in the state of high tension with two or more set-up rolls.

[0028]As the pressurizing belt 14 of endless form, it is usable in a synthetic resin or a metal mesh shape belt, a conveyor chain, etc. It is usable in the thing of various shape, such as circular, a rectangle, and a tortoise shell form, and to the base fabric 1, meshes of a net have a rugged surface all over the belt so that partial compactions, such as a field compaction and a line compaction, may be possible.

[0029]Although the wet sheet 1a is dried by the dryer part 6 after deliquoring, By letting the water absorption ingredient adherent sheet 1b in the state where it became wet including a part for a certain amount of liquid by controlling or adjusting drying temperature moderately pass between the compaction roll 13 and the pressurizing belt 14, The field where water absorption ingredients, such as SAP and MFC, have adhered touches the compaction roll 13,

and the undersurface of the base fabric 1 comes to touch the pressurizing belt 14. Thus, by carrying out a partial compaction by a wet state, as shown in drawing 5 which a tangle in SAP, MFC, and the cilia of the base fabric 1 became good, and was described above, the base fabric 1, and SAP and MFC become entangled in one, and will be in the state where it joined together.

[0030]A partial compaction is possible, drying the water absorption ingredient adherent sheet 1b by heating the compaction roll 13, Or it rolls round with the compaction part 9, and another dryer part is provided between the rolls 8, the water absorption ingredient adherent sheet 1b after a compaction is dried again, and it rolls round as the substrate 7 for products, and may be made to roll round on the roll 8.

[0031]Drawing 7 shows other examples of the compaction part 9. The compaction part 9 which was rolled round with the dryer part 6 and provided between the rolls 8, It is not what is limited to the compaction roll 13 shown in a second embodiment, and the pressurizing belt 14, As shown in drawing 7, pressure welding of the pressure roll 11 which formed the uneven part 10 all over the peripheral face as well as the above to parallel state is enabled at the aforementioned compaction roll 13, The adhering base fabric 1 can form the same shape as the above, and the water absorption ingredient of structure by letting the water absorption ingredient adherent sheet 1b pass between the compaction roll 13 and the pressure roll 11. Therefore, the pressurizing belt 14 becomes unnecessary in this case.

[0032]Drawing 8 shows the example of further others of the compaction part 9, rolls round the compaction part 9 which consists of the compaction roll 15 made into up-and-down parallel state with the couple in this example, and the pressure roll 16 with the dryer part 6, and installs it between the rolls 8, It is made to make it run the water absorption ingredient adherent sheet 1b horizontally between the compaction roll 15 and the pressure roll 16.

[0033]In this case, a partial pressure can be given to the base fabric 1 to which the water absorption ingredient adhered, if the same uneven part 10 as the aforementioned pressure roll 11 is formed in the whole peripheral face surface of the pressure roll 16 and this roll 16 is welded by pressure to the compaction roll 15 in the cylinder 12 as well as the aforementioned case.

[0034]As for the base fabric 1 to which, as for being careful in the above-mentioned compaction, the water absorption ingredient adhered, it is desirable that it is in the damp state having contained a certain amount of moisture, The uneven part 10 of the pressure rolls 11 and 16, the rugged surface of the pressurizing belt 14, etc. are welding by pressure spreading sides, such as the undersurface of the base fabric 1, i.e., SAP, and MFC, to an opposite side. There is a danger that SAP, MFC, etc. will adhere to the uneven part 10 or a rugged surface as if the uneven part 10, a rugged surface, etc. are directly welded by pressure to the spreading side of SAP or MFC, or SAP and MFC will be removed in the uneven part 10 or a

rugged surface.

[0035]The coating box 17 which can install the above mentioned coating part 3 on the base fabric 1 in the state of carrying out the opening of the upper and lower sides as shown in drawing 9, and intersecting perpendicularly with the length direction (running direction) of the base fabric 1 is used. By installing this coating box 17 on the base fabric 1 which runs, and forming the clearance 19 between the side attachment wall 18 and the base fabric 1 which are located in the side attachment wall of one side of the coating box 17, i.e., the running direction downstream of the base fabric 1, As for the polymers hydrophilic resin slurry accommodated in the coating box 17, the water absorption layer 4 is formed all over the upper surface of the base fabric 1 in the lateral width of the clearance 19, and the range of a height interval. Although this water absorption layer 4 is a case where it applies all over almost [of the base fabric 1], it may be the water absorption layer 4 of two or more stripe patterns which met in the length direction of the base fabric 1 as shown in drawing 10 which uses the coating device of another form. The support plate which supports the base fabric 1 from a lower part in the position corresponding to the coating box 17 in the numerals 20 in a figure, and 21 are polymers hydrophilic resin slurries.

[0036]

[Effect of the Invention]As mentioned above, according to explained this invention, in the coating part 3, apply the polymers hydrophilic resin slurry 21 to the sheet-shaped base fabric 1 made of a nonwoven fabric, and the water absorption layer 4 is formed, In the deliquoring part 5, a part for the liquid which has sunk into a part for liquid and the base fabric 1 which are contained in the water absorption layer 4 Suction, By carrying out the compaction of the base fabric 1 (water absorption ingredient adherent sheet 1b) in the state where it became wet which deliquors, carries out a drying process, rolls round the sheet shaped dry substrate 7 for products, and is rolled round on the roll 8 and which formed the compaction part 9 in process and adhered water absorption ingredients, such as SAP and MFC, It is combined in one in the state where a water absorption ingredient permeates to the base fabric 1, and a water absorption ingredient does not separate from the base fabric 1 at the time of the wet which inhaled the time of dry cleaning when wearing, and water.

[0037]Since SAP, MFC, etc. get twisted around the cilia of the base fabric 1 by giving a partial compaction especially to the water absorption ingredient adherent sheet 1b in the compaction part 9, Adhesion, such as SAP to the base fabric 1 and MFC, improves, and the thickness of the whole sheet is reduced, A rugged surface produces all over the substrate 7 for products, it is good, manufacture of the product which pliability and flexibility were given and was set by the curve of the body is possible, and the processability as a product does not produce liquid leakage by water absorption at the time of wear.

[Translation done.]